Presentation to
Mayor's Infrastructure Finance Committee
Finance Work Group

Lincoln Wastewater System
Treatment Facilities NPDES Permit Renewal Status

January, 2003

Lincoln Wastewater System NPDES Permit Renewal Process

- **National Pollutant Discharge Elimination System (NPDES)**
  - Applies to all discharges to the waters of State
  - Permits issued by State NDEQ with oversight by EPA – Region 7
- NPDES Discharge Permit Application
  - Theresa St. WWTP - 1988
  - Northeast WWTP – 1992
  - Current permits and limits extended by NDEQ since above dates
- Currently no Ammonia Limits

Background - Salt Creek System

- Unique saline heavily channelized system
  - salinity 10 - 15 times higher than ambient
  - flood control (1897 - 1950's)
  - highly variable flows
  - high width-to-depth ratio
- Poor habitat quality
  - limits biological communities
  - 50 - 75 percent of Wilderness Park habitat (reference)
- Need for site-specific studies and site-specific ammonia criteria

Salt Creek Water Quality Studies (SCWQS) Charge

- Address unique nature of Salt Creek
- Provide site-specific comprehensive and integrated information to support water quality permitting decisions
  - Objectives - 1994:
    - Characterize the health of fish and benthic macroinvertebrates
    - Assess the major limiting factors to the biological community
      - Channelization; naturally high chloride; effluent ammonia
- Ensure capital improvements are warranted but protective of Salt Creek biological communities

Chronology of Salt Creek Water Quality Studies - System Studied for Over 10 Years

- SCWQS - Work Plan 1994
  - Chemical, physical, biological and whole effluent toxicity (WET)
- Comprehensive monitoring - 1994 – 1999
  - >10,000 chemical samples
  - bioassessment twice per year
  - WET testing
- Class "S" Stream Sub-use proposed to Nebr. EQC – 1997
- Demonstration Project Work Plan - 1997
  - Integration of bioassessment
  - *In Situ* testing
  - Peer Review needed

Chronology of Salt Creek Water Quality Studies - System Studied for Over 10 Years (Cont.)

- Water Environment Research Foundation (WERF) Peer Review - 1998
  - Independent 3rd Party External Peer Review
  - Peer Review Panel of National Experts with diverse expertise in water quality
  - Oversight on work plans, results, and interpretation
  - Technical Interaction with NDEQ Staff
- *In Situ* testing - 1999
- Comprehensive data evaluation/integration - 1999 - 2000
  - Final Report June 2000
- Presentation of results to EPA - December 2001
- Acceptance of site-specific chronic ammonia criteria
  - NE Environmental Quality Council (EQC) - 2002

Water Environment Research Foundation (WERF) Peer Review Charge

- Are methodologies and approach for biological assessments scientifically defensible for assessing chronic sublethal effects
  - of human activities
  - of WWTP effluent
  - of ammonia
- Are biological, physical, chemical, and toxicological data scientifically defensible for assessing chronic sublethal effects:
  - of human activities
  - of WWTP effluent
  - of ammonia

WERF Peer Review Charge (Cont.)

- Review and Assess Whether the Following are Scientifically Defensible:
  - Methodologies for assessing acute, chronic, sublethal, and other effects using bioassessment, *in situ* or chemical testing.
  - Use of bioassessment, *in situ* testing, or other data to develop site-specific chronic ammonia criteria.
  - Simulation modeling to predict Salt Creek ammonia.
  - Planned quality assurance and quality control.

Comparison of NDEQ Proposed Limits and Current Site Specific Proposed Ammonia Limits

	Season and Ammonia Permit Limit					
	Spring		Summer		Winter	
Scenario	Daily Max. (mg/l)	Chronic (mg/l)	Daily Max. (mg/l)	Chronic (mg/l)	Daily Max. (mg/l)	Chronic (mg/l)
NDEQ 1994 Proposed Limits (Note 1)						
Theresa St.	*No Spring Season*		3.87	1.48	7.05	2.70
Northeast	*No Spring Season*		3.87	1.48	7.05	2.69
Current Site-Specific Criteria Proposed Draft Limits (Note 2)						
Theresa St.	21.5	8.2	9.1	3.5	21.8	8.3
Northeast	33.9	12.9	14.9	5.7	41.1	15.7

Note 1 - NDEQ 1994 proposed limits did not include a spring season. Summer limits would have applied during current spring season

Note 2 - Proposed draft limits based on projected 2007 WWTF flows

Current Benefits of Water Quality Studies

- Higher chronic ammonia stream criteria based on site-specific factors
  - Approximately 27 percent increase (Accepted by EQC)
- Increase in Salt Creek low flow
- Application of 30Q5 Salt Creek low flow vs. 7Q10 low flow (more dilution)
- Current Proposal - Increase in mass loading and permit limits
  - Proposed permit limits vs. original 1994 NDEQ proposed limits:
    - Theresa St.: 240 to 550 % increase
    - Northeast: 380 to 870 % increase
- Increase in chronic mixing zone
  - Maximum allowable dilution

Current Benefits of Water Quality Studies (Cont.)

- Three-season ammonia permit limits
  - Summer, Winter and Spring season's vs. Summer & Winter
  - Relief for the Spring season
- Flow-based ammonia effluent limit under higher flows
  - Flexibility in WWTP operation
- Tiered effluent flows for ammonia effluent limits
  - Discharge limits calculated based on effluent flows representative of current conditions (less restrictive) and not restricted to flows that may not occur for 10 or 20 years.

NDEQ and City Interaction

- Gained support and credibility
  - Through "sound science" approach to protect aquatic communities and meet water quality standards
- Technical and regulatory components of all previously listed benefits are supported by NDEQ through City recommendations and supporting information gathered through the Salt Creek Water Quality Studies
- NDEQ is an advocate for the City
  - Taking proposals forward to EPA and EQC

Water Quality Studies
Current Status

- Site-Specific Ammonia Criteria - *Adopted by EQC in 2002*
- Wasteload Allocation - *Components agreed by NDEQ*
- Ammonia Permit Limits - *Draft and supported by NDEQ*
- Permit Development - *Underway with joint City/NDEQ effort*
- Facility Plan Update - *Integrated in current draft*

Comparison of Lincoln Wastewater Treatment Costs to Meet Ammonia Removal Requirements

	1994			2002		
Item	**T. St.**	**NE**	**Total**	**T. St.**	**NE**	**Total**
Capacity	24 mgd	8.5 mgd	32.5 mgd	26 mgd	10 mgd	36.mgd
Capital Cost[1]	$41,600,000	$4,700,000	$46,300,000	$23,000,000	$9,000,000	$32,000,000
SCWQS Cost[2]						$3,700,000

[1] 1994 capital cost estimates are represented as 2002 dollars assuming a 4 percent annual interest rate.
[2] SCWQS costs represent only fees paid to consultants and are presented in actual dollars rather than 2002 dollars because they were dispersed unevenly over the period from 1994 through 2002.